



1. **DESCRIPTION:** Teams will complete one or more tasks and answer a series of questions involving the science processes of chemistry focused in the areas of chemical reactions/stoichiometry and kinetics.

A TEAM OF UP TO: 2

APPROXIMATE TIME: 50 minutes

EYE PROTECTION: C

CALCULATOR: Class III

2. **EVENT PARAMETERS:**

- Each participant must bring safety equipment (e.g., goggles, lab coat, apron), a writing implement, and may bring a Class III calculator.
- Each participant may bring one 8.5" x 11" sheet of paper, which may be in a sheet protector sealed by tape or laminated, with information on both sides in any form and from any source.
- Teams should bring any or all of the items listed on the Division C Chemistry Events Lab Equipment List, posted on soinc.org. Teams not bringing these items will be at a disadvantage, as they are not provided.
- Participants must wear goggles, an apron or a lab coat and have skin covered from the neck down to the wrist and toes. Gloves are optional, but if the host requires a specific type they will notify teams. Pants should be loose fitting; if the host has more specific guidelines, they will notify teams in advance of the tournament. Shoulder length or longer hair must be tied back. Participants removing safety clothing/goggles or unsafely handling materials, or equipment will be penalized or disqualified.
- Supervisors will provide any required reagents, additional glassware, and/or references that are needed for the tasks (e.g., Periodic Table, table of standard reduction potentials, any constants needed).

3. **THE COMPETITION:**

- The competition will consist of a series of tasks focused on the areas of chemical reactions/stoichiometry and kinetics. These tasks could include hands-on activities, questions on listed topics, interpretation of data (e.g., graphs, diagrams, tables), or observation of an established and running experiment. **At least 2 activities, one on each topic, are required.**
- Teams may be asked to collect data using a probe ware set-up demonstrated by the Supervisor(s). Following a demonstration of the sensors/probes, participants may be given data sets to interpret.
- Nomenclature, formula writing, & stoichiometry (mole conversions & percentage yield) are essential tools of chemistry & may be included in the event. Participants are expected to know the symbols & charges for: nitrate, carbonate, phosphate, acetate, sulfate, ammonium, bicarbonate, & hydroxide. Participants should know how to use the "ite" form of anion (one less oxygen than the "ate" form). With a periodic table, participants should be able to obtain charges for monatomic ions (e.g., Na^+ , S^{2-}).
- Participants should understand the following about Chemical Reactions/Stoichiometry:
 - classification of reaction type.
 - balancing reactions.
 - reaction prediction (including predicting products of metathesis reactions, solubility, oxidation-reduction, total ionic and net ionic equations).
- Students will demonstrate an understanding of the principles of kinetics by:**
 - Measuring reaction rates and identify how and why reaction conditions (temperature, concentration, particle size, and catalysts) affect reaction rates.**
 - At the state and national levels, teams will be asked to determine rate laws from actual experimentation or data provided, and teams should also be able to determine rate constants with correct units.**

4. **SCORING:**

- High score wins. Points will be divided evenly between kinetics and chemical reactions/stoichiometry.
- Time may be limited at each task but will not be used as a tiebreaker or for scoring.
- Ties will be broken by pre-selected questions.
- A penalty of up to 10% may be given if the area is not cleaned up as instructed.
- A penalty of up to 10% may be given if a team brings prohibited lab equipment to the event.

Recommended Resources: The Science Olympiad Store (store.soinc.org) carries a variety of resources to purchase; other resources are available on the Event Pages at soinc.org.